

REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated April 18, 2006 (U.S. Patent Office Paper No. 03292006). In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

As outlined above, claims 6 and 17-18 stand for consideration in this application, while claim 6 is being amended to correct formal errors and to more particularly point out and distinctly claim the subject invention. Claim 1-5 and 7-16 stands withdrawn from consideration in this application. In addition, new claims 17-18 are hereby submitted for consideration.

Additional Amendments

The specification is being amended to correct formal errors and to better disclose and describe the features of the present invention as claimed. All amendments to the application are fully supported therein. Support for amendment of claim 6 may be found on page 5, line 27 - page 6, line 2 of the specification and Fig. 2 (A)-(C). Support for new claims 17-18 may be found on page 6, lines 2-4 of the specification. Applicant hereby submits that no new matter is being introduced into the application through the submission of this response.

Formal Objections

The disclosure was objected to because of the informalities on the grounds that it is not clear as to what the phrase "reflected light or confusion (scattered?) light" on page 7, line 18 means.

The specification is being amended to replace "confusion (scattered?)" with --scattered--. Accordingly, withdrawal of this objection is respectfully requested.

Formal Rejections

Claim 6 was rejected under 35 U.S.C. §112, second paragraph, for being as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. In particular, the Office Action contends that the term

“functional beads” in lines 2 and 4-6 is vague and indefinite and unclear whether or not the term “functional beads” in lines 2 and 4-6 is referring to “beads” in line 1. The Office Action further contends that there is insufficient antecedent basis for “the surface” in line 2.

Claim 6 is being amended to delete the term “functional” and replace “the surface” with --a surface--. Accordingly, withdrawal of this rejection is respectfully requested.

Prior Art Rejections

35 U.S.C. §103(a) rejection

Claim 6 was rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Ho (US Pub. No. 2002/0164271) in view of Kulmala et al (US Pub. No. 2002/0081749). This rejection is respectfully traversed for the reasons set forth below.

According to the Manual of Patent Examining Procedure (M.P.E.P. §2143),

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both not found in the prior art, not in the applicant’s disclosure.

The Office Action contends that Ho teaches a multiplexing approach to optically bar code microspheres with the incorporation of semiconductor nanocrystals (nanoparticles) such as quantum dots and further teaches a method for reading beads comprising the steps of introducing functional beads having a coating layer on the surface thereof and having nanoparticles such as quantum dots present in the coating layer to a flow path; enabling the functional beads in the flow path to emit light with a wavelength specific to the nanoparticles; and identifying the functional beads based on the emission except that Ho fails to teach a method of enabling functional beads to emit light with a wavelength specific to nanoparticles by applying a voltage to the functional beads.

The Office Action further contends that Kulmala teaches that use of active metal electrode or semiconductor electrode makes it possible to simultaneously excite a variety of different luminescent labeling substances in fully aqueous solution and the method and apparatus of Kulmala can be used with one or several types of label substances, which can be

simultaneously electrically excited by applying a voltage so that the resulting luminescence can be utilized in bioaffinity assays such as immunoassays and DNA or RNA probing assays, and that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use metal electrodes or semiconductor electrodes to apply voltage as an enabling means as taught by Kulmala in order to excite luminescent labels (nanocrystals/nanoparticles) present in the functional beads of Ho for use in multiplexing approach for optical bar coding since the method of using active metal electrodes or semiconductor electrodes makes it possible to simultaneously excite a variety of different luminescent labeling substances in fully aqueous solution.

The distinctive features, among others, of the present invention as now recited in claim 6 are introducing beads having a coating layer on a surface thereof and having nanoparticles present in the coating layer to a flow path, wherein a pair of electrodes are disposed so as to come into contact with the surface of the beads; enabling the beads to emit light with a wavelength specific to the nanoparticles by applying a voltage to the beads in the flow path via the electrodes with which the beads have brought into contact, the voltage being applied to the electrodes. As shown in Figs. 2 (A)-(C), the electrodes are disposed in the flow path to have a smaller space than the size of nanoparticles so that the surface of the nanoparticles certainly contacts the electrodes. Because the beads unfailingly contact with the electrodes to which the voltage is applied, the voltage is unfailingly applied to the beads via the electrodes, and therefore the light is emitted from the beads with more certainty. Consequently, it is more certain to identify the beads in the flow.

In contrast, Ho merely shows a multiplexing approach to optically bar code microspheres with the incorporation of semiconductor nanoparticles for biological assay application. Ho shows that a mixture of the wavelength-coded quantum dots latex beads are optically decoded by their fluorescent spectra when excited with a light source. ([0039], Fig. 4). However, Ho does not explicitly or implicitly show that a pair of electrodes is disposed so as to come into contact with the surface of the beads and supplying a voltage to the beads in the flow path which have brought into contact with the electrode.

Kulmala is directed to a method and apparatus of electrical excitation of label substances at electrodes covered with insulating layers and utilization of the resulting luminescence in bioaffinity assays. Kulmala merely shows applying an electric field on the entire surface of a plane region of the electrode and detecting the luminescence signal in the region. However, Kulmala also does not explicitly or implicitly show that a pair of

electrodes is disposed so as to come into contact with the surface of the beads and supplying a voltage to the beads in the flow path which have brought into contact with the electrode.

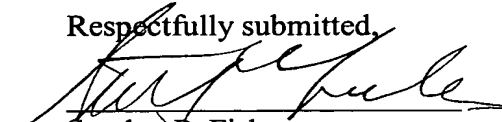
Furthermore, there is no suggestion or motivation in either Ho or Kulmala to combine these features explicitly or implicitly, or in the knowledge generally available to one of ordinary skill in the art at the time the invention was made to embody all the features of the invention as recited in claim 6. Accordingly, claim 6 is not obvious in view of all the prior art.

Conclusion

In view of all the above, Applicants respectfully submit that certain clear and distinct differences as discussed exist between the present invention as now claimed and the prior art references upon which the rejections in the Office Action rely. These differences are more than sufficient that the present invention as now claimed would not have been anticipated nor rendered obvious given the prior art. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicant's undersigned representative at the address and phone number indicated below.

Respectfully submitted,



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